

Rockets Away

TEACHER SECTION

Grade Level: K - 4

Subject(s):

Science,
Technology

Prep Time:

10 minutes

Duration:

One class period

Materials Category:

Household

Objective

To observe Newton's Third Law of Motion.

National Education Standards Science

Science as Inquiry

Abilities necessary to do scientific inquiry

Understandings about scientific inquiry

Physical Science

Properties and changes of properties in matter

Science and Technology

Abilities of technological design

Technology Literacy

- Students will develop an understanding of the role of troubleshooting, research and development, invention and innovation and experimentation in problem solving.
- Students will develop an understanding of and be able to select and use transportation technologies.

Pre-lesson Instructions

- Note that oblong shaped balloons work best for this activity.
- Use fishing line for this activity.
- Duplicate the Student Pages (one per student).
- Place students in groups of two to four.

Background Information

Thrust is the force that moves an aircraft through the air. Thrust is used to overcome the drag of an airplane and to overcome the weight and drag of a rocket. Thrust is generated by the engines of the aircraft through some kind of propulsion system.

Thrust is a mechanical force, so the propulsion system must be in physical contact with a working fluid or atmosphere to produce thrust. Thrust in a rocket or jet engine is generated through the reaction to accelerating a mass of gas. The engine does work on the gas and accelerates the gas to the rear of the engine. The forward thrust is generated in the opposite direction from the accelerated gas. Since thrust is a force, it is a vector quantity having both a magnitude and a direction. The direction of the thrust is forward and the magnitude is the strength of the force

Guidelines

1. Discuss how the rocket moves.
2. Tell students that they will complete an activity that will show them how fuel helps a rocket move.
3. Demonstrate the activity. See Discussion section for details.



MATERIALS

- Balloon
- Tape
- Straws
- Lightweight string
- Student Pages

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Discussion / Wrap-up

- Tell students, "Rockets, jet engines and spaceships are all driven forward by the same law: every action has an equal and opposite reaction. This means pushing something out of the back of a rocket will give the rocket a forward push of the same force. In the case of rockets, the materials pushed out the back are the hot expanding gases from the burning of jet or rocket fuel. The balloon works the same way as a rocket does. The air inside the sealed balloon pushes outward in all directions. When it is sealed inside, the gas can't go anywhere, and neither can the balloon. As soon as you removed the clothespin, the gas blew out the back at high speed. It pushed the balloon away in the opposite direction.
- Possible answers to the Student Pages:

<p>1. State the problem.</p> <p>QUESTION (What do I want to know?)</p>	<p>How does a rocket engine move the rocket?</p>
<p>2. Form a hypothesis.</p> <p>PREDICTION (What do I think is going to happen?)</p>	<p>Air comes out the back end and pushes it forward.</p> <p>Air blows out one way, and the rocket moves the other way.</p>
<p>3. Design an experiment.</p> <p>MATERIALS and PROCEDURES (What steps will I take to do this experiment? What things do I need?)</p>	<p>Materials:</p> <ul style="list-style-type: none"> • Two desks • Balloon • Straw • String • Clothes pin <p>Procedure:</p> <ol style="list-style-type: none"> 1. Collect materials. 2. Fill the balloon with air. Do not tie a knot -- hold it so that no air gets out. 3. Hold the balloon up with the opening facing away from you. 4. Let go of balloon. 5. Make observations.
<p>4. Perform the experiment.</p> <p>OBSERVE and RECORD DATA (What did I learn?)</p>	<p>Procedure:</p> <ol style="list-style-type: none"> 1. Place the desks 1.5 meters (~5 feet) apart. 2. Put the string through the straw. 3. Tie one end of the string to the top of the leg of one desk. 4. Pull the string tight. Tie it to the leg of the other desk. Make sure the string is pulled tight. 5. Inflate the balloon. Clip it with the clothes pin. Tape it to the straw. 6. Remove the pin. 7. Make observations.





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